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HEATING AND COOKING APPLIANCE  
[Kanetsu Choriki]

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## Specification

### 1. Title of the Invention

Heating and Cooking Appliance

### 2. Claims

(1) A heating and cooking appliance, wherein a deodorizing operation is possible by deodorizing the air inside a heating chamber via a deodorizing device through the operation of a fan device, and wherein the appliance is equipped with a control means for performing the deodorizing operation after the completion of the heating and cooking only for a period of time corresponding to the heating and cooking contents or the heating and cooking time.

### 3. Detailed Description of the Invention

[Purpose of the Invention]

(Industrial Field of Application)

The present invention relates to a heating and cooking appliance in which a deodorizing operation is possible by deodorizing the air inside a heating chamber via a deodorizing device through the operation of a fan device.

(Prior Art)

In an appliance such as an electronic range, some of the air from a fan device used to cool the magnetron during microwave heating

and cooking is passed through the heating chamber and discharged to the outside. This keeps the window in the door from fogging up. However, some of the odors generated by the heated and cooked product during heating and cooking is also discharged to the outside.

In recent years, a deodorizing device has been installed in the discharge passage from the heating chamber to remove odors from the discharged air.

(Problem Solved By the Invention)

However, in this configuration, the fan device for cooling the magnetron is shut down after the heating and cooking has been completed. As a result, fresh air cannot be sent into the heating chamber and the air containing odors cannot be discharged to the outside. For this reason, air containing odors remains inside the heating chamber after the heating and cooking has been completed. When the door is opened, the user encounters an unpleasant odor and the unpleasant odor lingers on the cooked food.

In order to eliminate this unpleasant odor, the fan device can be operated after the completion of heating and cooking by pressing a switch device. This discharges the lingering odors inside the heating chamber. However, it should not be necessary to operate the fan device manually after completing the heating and cooking.

Because the user does not know how long to operate the fan device manually, the deodorizing process may not be performed sufficiently and the unpleasant odors may still linger.

In light of this situation, the purpose of the present invention is to provide a heating and cooking device that is able to perform a deodorizing operation automatically and sufficiently after completing the heating and cooking.

[Configuration of the Invention]

(Means For Solving the Problem)

The present invention is a heating and cooking appliance, wherein a deodorizing operation is possible by deodorizing the air inside a heating chamber via a deodorizing device through the operation of a fan device, and wherein the appliance is equipped with a control means for performing the deodorizing operation after the completion of the heating and cooking only for a period of time corresponding to the heating and cooking contents or the heating and cooking time.

(Operation)

The amount of odor and the strength of the odor remaining inside the heating chamber after the heating and cooking are determined based on the heating and cooking time and the food that was heated

and cooked, for example, rice that was warmed up or fish that was fried.

Because the present invention is able to perform the deodorizing operation after heating and cooking using a control means, the user does not have to perform the operation manually. Because the deodorizing time is based on the heating and cooking time and the food that was heated and cooked, sufficient deodorization can be performed.

(Working Examples)

The following is an explanation of an electronic range in a working example of the present invention with reference to FIG 1 through FIG 4.

In Figs. 1 and 2, which are simplified schematics of the entire device, there is an inner box [3] inside an outer box [1] serving as the heating chamber [2]. The magnetron [5] is housed in a mechanical chamber [4] to the right of the inner box [3]. The chamber also houses a fan device [8] consisting of a propeller fan [7] attached to a motor [6]. The fan device [8] draws in outside air and feeds it to the magnetron [5]. Some of the air passing the magnetron [5] is supplied to the heating chamber [2] via a duct [9]. The air supplied to the heating chamber [2] is discharged to the outside via a

discharge duct [10] to the left of the inner box [3]. A deodorizing device [13] consisting of an oxidation catalyst [11] and a heater [12] for heating and activating the oxidation catalyst [11] is located inside the discharge duct [10].

The heater [14] for the oven and a circulating fan [15] are situated behind the inner box [3]. When the circulation fan [15] is rotated by the motor [16] during oven cooking, the air heated by the heater [14] is supplied to the heating chamber [2]. A heater for grilling [17] is located at the top of the inner box [3], and heat from this heater [17] radiates inside the heating chamber [2].

A door [18] for opening and closing the heating chamber [2] is attached to the front of the outer box [1] on hinges, and a control panel [19] is also situated on the front of the device. The control panel [19] has buttons such as a start button, a stop button and cooking time setting buttons and, as shown in Fig. 3, menu buttons [20] (only some are shown) and a display device [21]. A control device [22] with a microcomputer serves as the control means. It is located behind the control panel [19] as shown in Fig. 1. The control device [22] turns electricity on and off to the magnetron [5], the motors [6, 16] and the heaters [12, 14, 17] based on the operation of the buttons and preset programs.

The following is an explanation of the operation of this device with reference to the flowchart in Fig. 4.

After food has been placed inside the heating chamber [2] and a specific menu (cooking details) has been selected using the menu buttons [20], the heating and cooking time [t] is set using the cooking time buttons and the start button is pressed. The control device [22] then performs the heating and cooking based on the selected menu options (Step A). The heating and cooking is performed only for the selected time [t]. When the heating and cooking is complete, the control device [22] calculates the deodorizing operation time [T] (seconds) (Step B). The deodorizing operation time [T] is determined using the following equation.

$$T = (\text{Heating and Cooking Time } t/K) + 300$$

Here, K is a constant. The constant is determined using the following table.

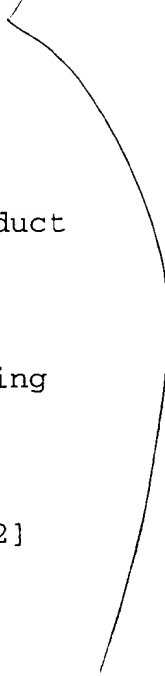
Cooking Instructions	Constant K	Cooking Time t	Deodorizing Time T
Re-Heat	5.0	5' 00"	6' 00"
Defrost	1.3	10' 00"	12' 41"
Snack	2.0	20' 00"	15' 00"
Fry	1.0	25' 00"	30' 00"
Deep Fry	1.4	15' 00"	15' 42"
Boil	5.3	80' 00"	20' 05"



When the cooking instruction (selected menu item) is "re-heat" and the heating and cooking time [t] is 5 minutes, the deodorizing time as shown in the table is calculated to be 6 minutes. When the cooking instruction is "fry" and the heating and cooking time [t] is 25 minutes, the deodorizing time is calculated to be 30 minutes.

After the deodorizing operation time [T] has been calculated, the control device [22] performs the deodorizing operation only for that time [T] (Step C). The deodorizing operation is performed by the motor [6] in the fan device [8] and the heater [12] in the deodorizing device [13]. During this time, "deodorizing" appears on the display device [21] to warn the user not to open the door [18] during the deodorizing operation.

During the deodorizing operation, air (outside air) passed through the fan [7] is supplied from the duct [9] to the heating chamber [2] and then discharged to the outside via the discharge duct [10]. The oxidation catalyst [11] is heated and activated by the heater [12], and the odor component is eliminated from the air being discharged from the heating chamber [2] to the outside. Because fresh air is re-supplied while the air from the heating chamber [2] containing odors is deodorized and discharged to the outside, air circulates inside the heating chamber [2] and odors are removed.



The heater [12] in the deodorizing device [13] also operates during the heating and cooking operation to deodorize the air discharged from the heating chamber [2].

In this working example, the deodorizing operation is automatically performed at the end of the heating and cooking operation so the user does not have to begin the deodorizing operation manually.

When rice is re-heated, the deodorizing operation does not have to be performed for a long period of time. When fish is fried, however, the deodorizing operation has to be performed for a long period of time to eliminate the strong odor. Generally speaking, the longer the heating and cooking operation, the longer the deodorizing operation. In this working example, however, the deodorizing operation is performed for a period of time corresponding to the food being cooked and the cooking time. As a result, sufficient deodorization is performed.

In this working example, the menu is selected using menu buttons [20] and the cooking time is selected using cooking time setting buttons. However, when a menu is selected using the menu buttons [20] and the start button is pressed, the control device [22] can

also automatically calculate the cooking time [t] based on the menu selection and the amount of food.

Figures 5 and 6 show another working example of the present invention. This working example differs from the previous working example in that the oxidation catalyst [24] in the deodorization device [23] is close to the heater for the oven [14]. In other words, the oxidation catalyst [24] is situated behind the place where air heated by the heater [14] is discharged to the heating chamber [2]. Here, the heater for the oven [14] is the heater used to heat and activate the oxidation catalyst [24], and the circulation fan [15] is the fan device [25] used to circulate air in the heating chamber [2] with the oxidation catalyst [24].

During the deodorizing operation after the heating and cooking operation, the output from the heater [14] is lowered, the circulation fan [15] is operated by the motor [16], and the air inside the heating chamber [2] is circulated through the oxidization catalyst [24]. In this way, the air inside the heating chamber [2] is deodorized. The deodorizing operation time is set in the same way as the previous working example.

Even with this configuration, the effect is the same as the previous working example.

The present invention is by no means limited to use in electronic ranges. It can be applied to a wide range of heating and cooking appliances.

#### (Effect of the Invention)

In the present invention, as explained above, the deodorizing operation is performed automatically after the heating and cooking operation has been completed. As a result, the user does not have to perform the deodorizing operation manually. Even though the amount and strength of the odor remaining in the heating chamber after heating and cooking varies, the amount of time the heating and cooking operation is performed changes, and the items heated and cooked are different, the deodorizing operation time is performed for the amount of time determined based on the heating and cooking time or the item cooked. As a result, sufficient deodorization can be performed.

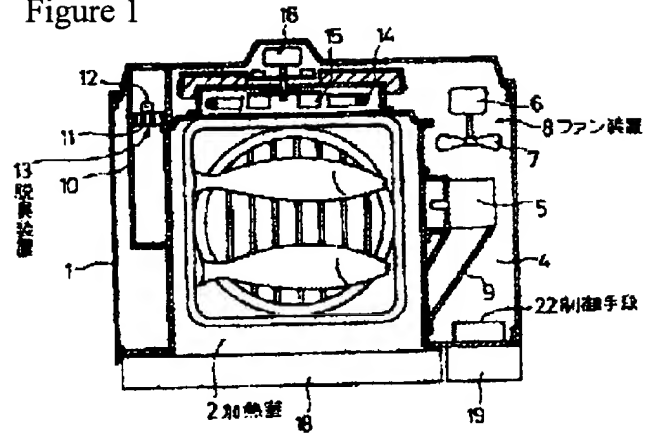
#### 4. Brief Explanation of the Drawings

Figures 1 through 4 show working examples of the present invention. Figure 1 is a horizontal cross-sectional view. Figure 2 is a vertical cross-sectional view. Figure 3 a planar view of the control panel. Figure 4 is a flowchart showing the control details. Figures 5 and 6 are a vertical cross-sectional view of another

working example of the present invention and a perspective view of the deodorizing device.

In the figures, **2** denotes a heating chamber, **8** denotes a fan device, **10** denotes a discharge duct, **11** denotes an oxidation catalyst, **12** denotes a heater, **13** denotes a deodorizing device, **20** denotes menu buttons, **22** denotes a control device (control means), **23** denotes a deodorizing device, and **24** denotes an oxidation catalyst.

Figure 1



- 2 ... heating chamber
- 8 ... fan device
- 13 ... deodorizing device
- 22 ... control means

Figure 2

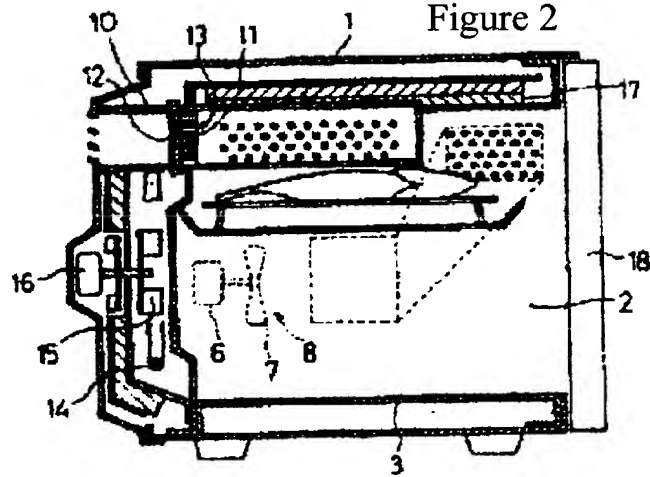
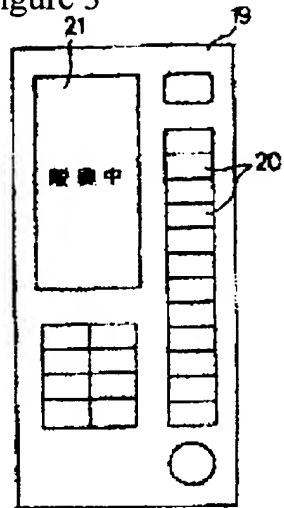
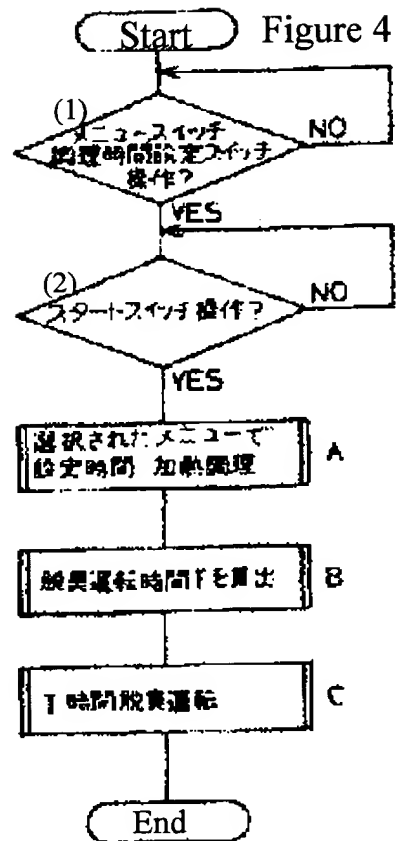


Figure 3



21 ... deodorizing



Key:

(1) Operate cooking time setting button in menu buttons?

(2) Operate start button?

A ... Set time for heating and cooking using selected menu

B ... Calculate deodorizing time T

C ... T time deodorizing operation



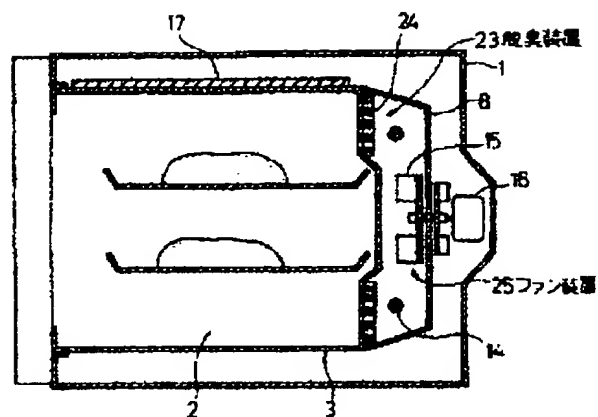


Figure 5

- 23 ... Deodorizing device
- 25 ... fan device

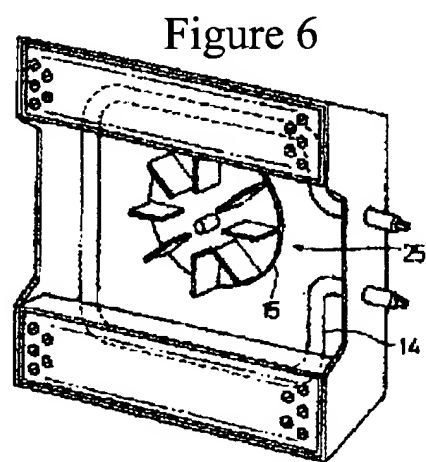


Figure 6